

IN THE CLAIMS:

1. (Currently Amended) A video data transmission/reception system comprising a transmission-side apparatus and a plurality of reception terminals, the transmission-side apparatus transmitting video data that has been compressed using motion compensation interframe prediction, and the reception terminals receiving the video data and decoding the
5 received video data, wherein

the transmission-side apparatus includes:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the first encoding unit applying interframe encoding processing to a plurality of frames of moving image data, to generate only interframe frame data for the video data;

10 a second encoding unit consisting of a second DCT unit and a second quantization unit, the second encoding unit applying in parallel with the encoding processing by the first encoding unit, intraframe encoding processing to a frame of the moving image data, to generate substitute I frame data for the video data;

an encoded video data generation unit connected to the first encoding unit and the
15 second encoding unit to combine the substitute I frame data and the interframe frame data to form the video data; and

a transmission unit transmitting the video data and the substitute I frame data to the plurality of reception terminals,

wherein when the transmission unit is to resume transmission of the video data to
20 one of the reception terminals after temporarily interrupting transmission of the video data to the reception terminal, the transmission unit checks whether a reference frame of a frame to be

transmitted after resuming transmission of the video data has been transmitted or not, and if the
reference frame has not been transmitted, ~~transmits at least one frame's worth of~~ the substitute I
frame data to the reception terminal for the frame for which the reference frame has not been
25 transmitted before resuming transmission of the video data,

the reception terminal, when the transmission unit is to resume the temporarily
interrupted transmission of the video data, receives the transmitted substitute I frame data,
decodes the received substitute I frame data, and uses the decoded substitute I frame data as
reference frame data to decode video data that is received after resumption of transmission, and

30 wherein the first encoding unit and the second encoding unit are included in a
same encoder which has one motion compensation unit and one predictive memory unit.

2. (Currently Amended) A video data transmission apparatus that transmits video
data that has been compressed using motion compensation interframe prediction to a plurality of
reception terminals, comprising:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the
5 first encoding unit applying interframe encoding processing to each of a plurality of frames of
moving image data, to generate only interframe frame data for the video data;

a second encoding unit consisting of a second DCT unit and a second quantization
unit, the second encoding unit applying in parallel with the encoding processing by the first
encoding unit, intraframe encoding processing to a frame of the moving image data, to generate
10 substitute I frame data for the video data;

an encoded video data generation unit connected to the first encoding unit and the second encoding unit to combine the substitute I frame data and the interframe frame data to form the video data; and

15 a transmission unit transmitting the video data and the substitute I frame data to the plurality of reception terminals, and when the transmission unit is to resume transmission of the video data to one of the reception terminals after temporarily interrupting transmission of the video data to the reception terminal, the transmission unit checks whether a reference frame of a frame to be transmitted after resuming transmission of the video data has been transmitted or not,
20 and if the reference frame has not been transmitted, transmits ~~at least one frame's worth of~~ the substitute I frame data to the reception terminal for the frame for which the reference frame has not been transmitted before resuming transmission of the video data,

wherein the first encoding unit and the second encoding unit are included in a same encoder which has one motion compensation unit and one predictive memory unit.

3. (Previously Presented) The video data transmission apparatus of Claim 2, further comprising:

an option data transmission unit transmitting option video data to the reception terminal, in parallel with the transmission of the video data,

5 wherein the interruption of video data transmission to the reception terminal is caused by the transmission of the option video data.

4. (Previously Presented) The video data transmission apparatus of Claim 3, wherein

the option data transmission unit

includes an information collection sub-unit operable collecting from each of one
5 or more of the reception terminals, information about preferences of a user of the reception
terminal, and

based on the collected information, selects contents of option data to be
transmitted.

5. (Previously Presented) The video data transmission apparatus of Claim 3,
wherein

the transmission unit includes

a broadcast transmission sub-unit broadcasting a same data to a plurality of
5 transmission destinations; and

an individual transmission sub-unit transmitting individual data to an individual
transmission destination,

wherein the broadcast transmission sub-unit transmits the video data, and the
individual transmission sub-unit transmits the substitute I frame data, and

10 the option data transmission unit transmits the option video data in an individual
transmission manner.

6. (Previously Presented) The video data transmission apparatus of Claim 5,
wherein

the transmission unit includes

a switch sub-unit exempting a reception terminal to which substitute I frame data
5 or option video data is being transmitted from being a target of transmission of the video data by
the broadcast transmission sub-unit.

7. (Previously Presented) The video data transmission apparatus of Claim 3,
wherein

the option data transmission unit includes

an insertion sub-unit transmitting secondary option data part way through
5 transmission of the option data; and

a third encoding sub-unit generating option data substitute I frame data that
corresponds to at least one frame of the option data starting from a frame that is a first frame
after transmission resumption, after transmission of the secondary option data ends and before
transmission of the option data resumes,

10 wherein when transmission of the option data is to resume after the transmission
of the secondary option data ends, the option data transmission unit transmits the option data
substitute I frame data to the reception terminal before transmission of the option data resumes.

8. (Cancelled)

9. (Original) The video data transmission apparatus of Claim 2, wherein

the transmission unit determines how many frames of substitute I frame data to
transmit to the reception terminal before resuming transmission of the video data, based on a
GOP structure of the video data, and in particular, based on a frequency of appearance of frames
5 having an I attribute or a P attribute.

10. (Currently Amended) A video data transmission apparatus that transmits video
data that has been compressed using motion compensation interframe prediction to a plurality of
reception terminals, comprising:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the
5 first encoding unit applying intraframe encoding processing to a frame of moving image data, to
generate intraframe encoded video data;

a second encoding unit consisting of a second DCT unit and a second quantization
unit, the second encoding unit applying interframe encoding processing to a frame of moving
image data, to generate interframe encoded video data;

10 a video data generation unit generating the video data from the intraframe
encoded video data and the interframe encoded video data; and

a transmission unit transmitting the video data to the plurality of reception
apparatuses,

wherein when the transmission unit is to resume transmission of the video data to
15 one of the reception terminals after temporarily interrupting transmission of the video data to the
reception terminal, the transmission unit checks whether a reference frame of a frame to be
transmitted after resuming transmission of the video data has been transmitted or not, and if the
reference frame has not been transmitted, transmits at least one frame's worth of the substitute I
frame data to the reception terminal for the frame for which the reference frame has not been
20 transmitted before resuming transmission of the video data, and

wherein the first encoding unit and the second encoding unit are included in a
same encoder which has one motion compensation unit and one predictive memory unit.

11. (Currently Amended) A video data transmission/reception system comprising a
plurality of video data provision apparatuses, a plurality of reception terminals, and a distribution
server, the video data provision apparatuses transmitting video data that has been compressed

using motion compensation interframe prediction, each reception terminal receiving the video
5 data from any one of the video data provision apparatuses and decoding the received video data,
and the distribution server conveying the video data between the video data provision
apparatuses and the reception terminals, wherein

each video data provision apparatus includes:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the
10 first encoding unit applying interframe encoding processing to each of a plurality of frames of
moving image data, to generate only interframe frame data for the video data;

a second encoding unit consisting of a second DCT unit and a second quantization
unit, the second encoding unit applying in parallel with the encoding processing by the first
encoding unit, intraframe encoding processing to each of a plurality of frames of the moving
15 image data, to generate substitute I frame data; and

an encoded video data generation unit connected to the first encoding unit and the
second encoding unit to combine the substitute I frame data and the interframe frame data to
form the video data,

wherein the first encoding unit and the second encoding unit are included in a
20 same encoder which has one motion compensation unit and one predictive memory unit, and

the distribution server includes:

a switch request reception unit operable to receive a request from one of the
reception terminals to switch video data received by the reception terminal to different video
data; and

25 a switch transmission unit stopping transmission of the video data being
transmitted to the request-originating user terminal, checking whether a reference frame of a

frame to be transmitted during a start of transmission of the different video data has been transmitted or not, and if the reference frame has not been transmitted, obtaining substitute I frame data from a video data provision apparatus that is to provide the different video data[[,]]
30 and transmitting the obtained substitute I frame data to the user terminal, and transmitting the different video data to the user terminal, when the switch request reception unit receives the request from one of the reception terminals.

12. (Cancelled)

13. (Currently Amended) A video data provision apparatus in a video data transmission/reception system that includes a plurality of video data provision apparatuses, a plurality of reception terminals, and a distribution server, the video data provision apparatuses transmitting video data that has been compressed using motion compensation interframe
5 prediction, each reception terminal receiving video data from any one of the video data provision apparatuses, and the distribution server conveying the video data between the video data provision apparatuses and the reception terminals, the video data provision apparatus comprising:

a first encoding unit consisting of a first DCT unit and a first quantization unit, the
10 first encoding unit applying interframe encoding processing to each of a plurality of frames of moving image data, to generate only interframe frame data for the video data;

a second encoding unit consisting of a second DCT unit and a second quantization unit, the second encoding unit applying in parallel with the encoding processing by the first encoding unit, intraframe encoding processing to each of a plurality of frames of the moving
15 image data, to generate substitute I frame data;

an encoded video data generation unit connected to the first encoding unit and the second encoding unit to combine the substitute I frame data and the interframe frame data to form the video data; and

a transmission unit transmitting the video data to the distribution server, and,
20 when one of the reception terminals requests to switch video data being received to the video data being transmitted by the transmission unit, the transmission unit checks whether a reference frame of a frame to be transmitted after the switch has been transmitted or not, and if the reference frame has not been transmitted, transmits ~~transmit at least one frame of the~~ substitute I frame data to the reception terminal via the distribution server, before the switch, and
25 wherein the first encoding unit and the second encoding unit are included in a same encoder which has one motion compensation unit and one predictive memory unit.

14. - 15. (Cancelled)

16. (Currently Amended) A video data transmission/reception method used by a transmission-side apparatus and one of a plurality of reception terminals in a video data transmission/reception system in which the transmission-side apparatus that transmits video data that has been compressed using motion compensation interframe prediction, and the plurality of
5 reception terminals receive the video data and decode the received video data, the method comprising:

a first encoding step, in the transmission-side apparatus, of applying interframe encoding processing to a plurality of frames of moving image data, to generate only interframe frame data for the video data;

- 10 a second encoding step, in the transmission-side apparatus, of applying, in parallel with the first encoding step, intraframe encoding processing to each of a plurality of frames of the moving image data, to generate substitute I frame data;
- a combining step of combining I frame data and interframe frame data to generate the video data;
- 15 a video data transmission step, in the transmission-side apparatus, of transmitting the video data to ~~a reception-side apparatus~~ the one of the plurality of reception terminals;
- a transmission interruption step, in the transmission-side apparatus, of interrupting transmission of the video data to the ~~reception-side apparatus~~ one of the plurality of reception terminals;
- 20 a reference frame checking step, in the transmission-side apparatus, of checking whether a reference frame of a frame to be transmitted after resuming transmission of the video data to the one of the plurality of reception terminals has been transmitted or not;
- a substitute data transmission step, in the transmission-side apparatus, of transmitting ~~at least one frame's worth of~~ the substitute I frame data to the one of the plurality of
- 25 reception terminals for the frame for which the reference frame has not been transmitted, before resuming transmission of the video data to the one of the plurality of reception terminals;
- ~~terminal;~~
- a substitute data decoding step, in the reception terminal, of decoding the substitute I frame data;
- 30 a video data retransmission step, in the transmission side apparatus, of resuming transmission of the video data to the one of the plurality of reception terminals; and ~~terminal; and~~

a video data decoding step, in the reception terminal, of decoding the video data received after resumption of transmission, using data obtained as a result of executing the substitute data decoding step, as reference frame data,

35 wherein the first encoding step and the second encoding step are executed in a single encoder, the single encoder containing one motion compensation unit, one predictive memory unit, and two encoding units, each of the two encoding units consisting of a DCT unit and a quantization unit.

17. (Currently Amended) A computer readable medium embodying a executable in a computer, the program causing the computer to perform a video data transmission method used by a transmission-side apparatus in a video data transmission/reception system in which the transmission-side apparatus that transmits video data that has been compressed using motion
5 compensation interframe prediction, and a plurality of reception terminals receive the video data and decode the received video data, the method comprising:

 a first encoding step of applying interframe encoding processing to a plurality of frames of moving image data, to generate the video data;

 a second encoding step of applying, in parallel with the first encoding step,
10 intraframe encoding processing to each of a plurality of frames of the moving image data, to generate substitute I frame data;

 a combining step of combining I frame data and interframe frame data to generate the video data;

 a video data transmission step of transmitting the video data to one of the plurality
15 of reception terminals; ~~a reception-side apparatus;~~

a transmission interruption step of interrupting transmission of the video data to the one of the plurality of reception terminals; ~~reception-side apparatus;~~

a reference frame checking step of checking whether a reference frame of a frame to be transmitted after resuming transmission of the video data to the one of the plurality of
20 reception terminals has been transmitted or not;

a substitute data transmission step of transmitting ~~at least one frame's worth of the~~ substitute I frame data to the one of the plurality of reception terminals for the frame for which the reference frame has not been transmitted, before resuming transmission of the video data to the one of the plurality of reception terminals; and ~~reception terminal; and~~

25 a video data retransmission step of resuming transmission of the video data to the one of the plurality of reception terminals, ~~reception terminal,~~

wherein the first encoding step and the second encoding step are executed in a single encoder, the single encoder containing one motion compensation unit, one predictive memory unit, and two encoding units, each of the two encoding units consisting of a DCT unit
30 and a quantization unit.

18. (Currently Amended) The video data transmission apparatus of Claim 1 further comprising a substitute I frame buffer connected to the second encoding unit and the transmission unit to store substitute I frame data, ~~wherein the transmission unit transmits at least one frame's worth of the substitute I frame data to the reception terminal before resuming~~
5 ~~transmission of the video data using substitute I frame data stored in the substitute I frame buffer.~~

19. (Previously Presented) The video data transmission apparatus of Claim 2 further comprising means for storing substitute I frame data from the second encoding unit for transmission to the transmission unit.

20. (Previously Presented) The video data transmission apparatus of Claim 1 wherein the interframe data comprise P frame data and B frame data.

21. (New) The video data transmission apparatus of Claim 1 wherein the transmission-side apparatus further includes a frame judgment unit analyzing the interframe
5 frame data to obtain frame serial numbers.

22. (New) The video data transmission apparatus of Claim 21 wherein the transmission unit uses the frame serial numbers to determine whether a reference frame of a frame to be transmitted after resuming transmission of the video data has been transmitted or not.